SEQUENCE LISTING

<110> Galen, James E.

<120> PLASMID MAINTAINENCE SYSTEM FOR ANTIGEN DELIVERY

<130> F164622

<140> 09/453,313
<141> 1999-12-02

<150> US 09/204,117
<151> 1998-12-02

<150> US 60/158,738
<151> 1999-10-12

<160> 40

<170> PatentIn version 3.2

<210> 1
<211> 4196
<212> DNA
<213> Artificial Sequence

<220>
<223> Complete nucleotide sequence of pGEN2

<400> 1
gaattctgtg gtagcacaga ataatgaaaa gtgtgtaaag aagggtaaaa aaaaccgaat 60

gcgaggcatc cggttgaaat aggggtaaac agacattcag aaatgaatga cggtaataaa 120

taaagttaat gatgatagcg ggagttattc tagttgcgag tgaaggtttt gttttgacat 180

tcagtgctgt caaatactta agaataagtt attgatttta accttgaatt attattgctt 240

gatgttaggt gcttatttcg ccattccgca ataatcttaa aaagttccct tgcatttaca 300

ttttgaaaca tctatagcga taaatgaaac atcttaaaag ttttagtatc atattcgtgt 360

tggattattc tgcatttttg gggagaatgg acttgccgac tgattaatga gggttaatca 420

gtatgcagtg gcataaaaaa gcaaataaag gcatataaca gatcgatctt aaacatccac 480

aggaggatat ctgatgagta aaggagaaga acttttcact ggagttgtcc caattcttgt 540

tgaattagat ggtgatgtta atgggcacaa attttctgtc agtggagagg gtgaaggtga 600

tgcaacatac ggaaaactta cccttaaatt tatttgcact actggaaaac tacctgttcc 660

atggccaaca cttgtcacta ctttctctta tggtgttcaa tgcttttccc gttatccgga 720

tcatatgaaa cggcatgact ttttcaagag tgccatgccc gaaggttatg tacaggaacg 780

cactatatct ttcaaagatg acgggaacta caagacgcgt gctgaagtca agtttgaagg 840

tgataccctt gttaatcgta tcgagttaaa aggtattgat tttaaagaag atggaaacat 900

tctcggacac aaactcgagt acaactataa ctcacacaat gtatacatca cggcagacaa 960

acaaaagaat ggaatcaaag ctaacttcaa aattcgccac aacattgaag atggatccgt 1020

tcaactagca gaccattatc aacaaaatac tccaattggc gatggccctg tccttttacc 1080

agacaaccat tacctgtcga cacaatctgc cctttcgaaa gatcccaacg aaaagcgtga 1140

ccacatggtc cttcttgagt ttgtaactgc tgctgggatt acacatggca tggatgagct 1200

ctacaaataa tgagctagcc cgcctaatga gcgggctttt ttttctcggc ctagggccag 1260

caaaaggcca ggaaccgtaa aaaggccgcg ttgctggcgt ttttccatag gctccgcccc 1320

cctgacgagc atcacaaaaa tcgacgctca agtcagaggt ggcgaaaccc gacaggacta 1380

taaagatacc aggcgtttcc ccctggaagc tccctcgtgc gctctcctgt tccgaccctg 1440

ccgcttaccg gatacctgtc cgcctttctc ccttcgggaa gcgtggcgct ttctcatagc 1500

tcacgctgta ggtatctcag ttcggtgtag gtcgttcgct ccaagctggg ctgtgtgcac 1560

gaaccccccg ttcagcccga ccgctgcgcc ttatccggta actatcgtct tgagtccaac 1620

ccggtaagac acgacttatc gccactggca gcagccactg gtaacaggat tagcagagcg 1680

aggtatgtag gcggtgctac agagttcttg aagtggtggc ctaactacgg ctacactaga 1740

aggacagtat ttggtatctg cgctctgctg aagccagtta ccttcggaaa aagagttggt 1800

agctcttgat ccggcaaaca aaccaccgct ggtagcggtg gtttttttgt ttgcaagcag 1860

cagattacgc gcagaaaaaa aggatctcaa gaagatcctt tgatcttttc tacggggtct 1920

gacgctcagt agatctaaaa cactaggccc aagagtttgt agaaacgcaa aaaggccatc 1980

cgtcaggatg gccttctgct taatttgatg cctggcagtt tatggcgggc gtcctgcccg 2040

ccaccctccg ggccgttgct tcgcaacgtt caaatccgct cccggcggat ttgtcctact 2100

caggagagcg ttcaccgaca aacaacagat aaaacgaaag gcccagtctt tcgactgagc 2160

ctttcgtttt atttgatgcc tggcagttcc ctactctcgc atggggagac cccacactac 2220

catcggcgct acggcgtttc acttctgagt tcggcatggg gtcaggtggg accaccgcgc 2280

tactgccgcc aggcaaattc tgttttatca gaccgcttct gcgttctgat ttaatctgta 2340

tcaggctgaa aatcttctct catccgccaa aacagccaag ctggatcccc gatcttatca 2400

ggtcgaggtg gcccggctcc atgcaccgcg acgcaacgcg gggaggcaga caaggtatag 2460

ggcggcgcct acaatccatg ccaacccgtt ccatgtgctc gccgaggcgg cataaatcgc 2520

cgtgacgatc agcggtccag tgatcgaagt taggctggta agagccgcga gcgatccttg 2580

aagctgtccc tgatggtcgt catctacctg cctggacagc atggcctgca acgcgggcat 2640

cccgatgccg ccggaagcga gaagaatcat aatggggaag gccatccagc ctcgcgtcgc 2700

gaacgccagc aagacgtagc ccagcgcgtc ggccgccatg ccggcgataa tggcctgctt 2760

ctcgccgaaa cgtttggtgg cgggaccagt gacgaaggct tgagcgaggg cgtgcaagat 2820

tccgaatacc gcaagcgaca ggccgatcat cgtcgcgctc cagcgaaagc ggtcctcgcc 2880

gaaaatgacc cagagcgctg ccggcacctg tcctacgagt tgcatgataa agaagacagt 2940

cataagtgcg gcgacgatag tcatgccccg cgcccaccgg aaggagctga ctgggttgaa 3000

ggctctcaag ggcatcggtc gacgctctcc cttatgcgac tcctgcatta ggaagcagcc 3060

cagtagtagg ttgaggccgt tgagcaccgc cgccgcaagg aatggtgcat gcaaggagat 3120

ggcgcccaac agtcccccgg ccacggggcc tgccaccata cccacgccga aacaagcgct 3180

catgagcccg aagtggcgag cccgatcttc cccatcggtg atgtcggcga tataggcgcc 3240

agcaaccgca cctgtggcgc cggtgatgcc ggccacgatg cgtccggcgt agaggatcca 3300

caggacgggt gtggtcgcca tgatcgcgta gtcgatagtg gctccaagta gcgaagcgag 3360

caggactggg cggcggccaa agcggtcgga cagtgctccg agaacgggtg cgcatagaaa 3420

ttgcatcaac gcatatagcg ctagcagcac gccatagtga ctggcgatgc tgtcggaatg 3480

gacgatatcc cgcaagaggc ccggcagtac cggcataacc aagcctatgc ctacagcatc 3540

cagggtgacg gtgccgagga tgacgatgag cgcattgtta gatttcattt ttttttcctc 3600

cttattttct agacaacatc agcaaggaga aaggggctac cggcgaacca gcagcccctt 3660

tataaaggcg cttcagtagt cagaccagca tcagtcctga aaaggcgggc ctgcgcccgc 3720

ctccaggttg ctacttaccg gattcgtaag ccatgaaagc cgccacctcc ctgtgtccgt 3780

ctctgtaacg aatctcgcac agcgattttc gtgtcagata agtgaatatc aacagtgtga 3840

gacacacgat caacacacac cagacaaggg aacttcgtgg tagtttcatg gccttcttct 3900

ccttgcgcaa agcgcggtaa gaggctatcc tgatgtggac tagacatagg gatgcctcgt 3960

ggtggttaat gaaaattaac ttactacggg gctatcttct ttctgccaca caacacggca 4020

acaaaccacc ttcacgtcat gaggcagaaa gcctcaagcg ccgggcacat catagcccat 4080

atacctgcac gctgaccaca ctcactttcc ctgaaaataa tccgctcatt cagaccgttc 4140

acgggaaatc cgtgtgattg ttgccgcatc acgctgcctc ccggagtttg tctcga 4196

<210> 2
<211> 1197
<212> DNA
<213> Artificial Sequence

<220>
<223> Partial nucleotide sequence of pGEN3: nucleotides 1201-2397 encoding ori15A

<400> 2
ctacaaataa tgagctagcc cgcctaatga gcgggctttt ttttctcggc ctaggagata 60

cttaacaggg aagtgagagg gccgcggcaa agccgttttt ccataggctc cgccccctg 120

acaagcatca cgaaatctga cgctcaaatc agtggtggcg aaacccgaca ggactataaa 180

gataccaggc gtttcccccct ggcggctccc tcgtgcgctc tcctgttcct gcctttcggt 240

ttaccggtgt cattccgctg ttatggccgc gtttgtctca ttccacgcct gacactcagt 300

tccgggtagg cagttcgctc caagctggac tgtatgcacg aacccccccgt tcagtccgac 360

cgctgcgcct tatccggtaa ctatcgtctt gagtccaacc cggaaagaca tgcaaaagca 420

ccactggcag cagccactgg taattgattt agaggagtta gtcttgaagt catgcgccgg 480

ttaaggctaa actgaaagga caagttttgg tgactgcgct cctccaagcc agttacctcg 540

gttcaaagag ttggtagctc agagaacctt cgaaaaaccg ccctgcaagg cggtttttc 600

gttttcagag caagagatta cgcgcagacc aaaacgatct caagaagatc atcttattaa 660

tcagataaaa tatttctagg atctaaaaca ctaggcccaa gagtttgtag aaacgcaaaa 720

aggccatccg tcaggatggc cttctgctta atttgatgcc tggcagttta tggcgggcgt 780

cctgcccgcc accctccggg ccgttgcttc gcaacgttca aatccgctcc cggcggattt 840

gtcctactca ggagagcgtt caccgacaaa caacagataa aacgaaaggc ccagtctttc 900

gactgagcct ttcgttttat ttgatgcctg gcagttccct actctcgcat ggggagaccc 960

cacactacca tcggcgctac ggcgtttcac ttctgagttc ggcatggggt caggtgggac 1020

caccgcgcta ctgccgccag gcaaattctg ttttatcaga ccgcttctgc gttctgattt 1080

aatctgtatc aggctgaaaa tcttctctca tccgccaaaa cagccaagct ggatccccga 1140

tcttatcagg tcgaggtggc ccggctccat gcaccgcgac gcaacgcggg gaggcag 1197

<210> 3
<211> 2647
<212> DNA
<213> Artificial Sequence

<220>
<223> Partial nucleotide sequence of pGEN4: nucleotides 1201-3848 encoding ori101

<400> 3
ctacaaataa tgagctagcc cgcctaatga gcgggctttt ttttctcggc ctaggtttca 60

cctgttctat taggtgttac atgctgttca tctgttacat tgtcgatctg ttcatggtga 120

acagctttaa atgcaccaaa aactcgtaaa agctctgatg tatctatctt ttttacaccg 180

ttttcatctg tgcatatgga cagttttccc tttgatatct aacggtgaac agttgttcta 240

cttttgtttg ttagtcttga tgcttcactg atagatacaa gagccataag aacctcagat 300

ccttccgtat ttagccagta tgttctctag tgtggttcgt tgtttttgcg tgagccatga 360

gaacgaacca ttgagatcat gcttactttg catgtcactc aaaaattttg cctcaaaact 420

ggtgagctga atttttgcag ttaaagcatc gtgtagtgtt tttcttagtc cgttacgtag 480

gtaggaatct gatgtaatgg ttgttggtat tttgtcacca ttcattttta tctggttgtt 540

ctcaagttcg gttacgagat ccatttgtct atctagttca acttggaaaa tcaacgtatc 600

agtcgggcgg cctcgcttat caaccaccaa tttcatattg ctgtaagtgt ttaaatcttt 660

acttattggt ttcaaaaccc attggttaag ccttttaaac tcatggtagt tattttcaag 720

cattaacatg aacttaaatt catcaaggct aatctctata tttgccttgt gagttttctt 780

ttgtgttagt tcttttaata accactcata aatcctcata gagtatttgt tttcaaaaga 840

cttaacatgt tccagattat attttatgaa ttttttaac tggaaaagat aaggcaatat 900

ctcttcacta aaaactaatt ctaatttttc gcttgagaac ttggcatagt ttgtccactg 960

gaaaatctca aagcctttaa ccaaaggatt cctgatttcc acagttctcg tcatcagctc 1020

tctggttgct ttagctaata caccataagc attttcccta ctgatgttca tcatctgagc 1080

gtattggtta taagtgaacg ataccgtccg ttctttcctt gtagggtttt caatcgtggg 1140

gttgagtagt gccacacagc ataaaattag cttggtttca tgctccgtta agtcatagcg 1200

actaatcgct agttcatttg ctttgaaaac aactaattca gacatacatc tcaattggtc 1260

taggtgattt taatcactat accaattgag atgggctagt caatgataat tactagtcct 1320

tttccttga gttgtgggta tctgtaaatt ctgctagacc tttgctggaa aacttgtaaa 1380

ttctgctaga ccctctgtaa attccgctag acctttgtgt gtttttttg tttatattca 1440

agtggttata atttatagaa taaagaaaga ataaaaaaag ataaaaagaa tagatcccag 1500

ccctgtgtat aactcactac tttagtcagt tccgcagtat tacaaaagga tgtcgcaaac 1560

gctgtttgct cctctacaaa acagacctta aaaccctaaa ggcttaagta gcaccctcgc 1620

aagctcgggc aaatcgctga atattccttt tgtctccgac catcaggcac ctgagtcgct 1680

gtctttttcg tgacattcag ttcgctgcgc tcacggctct ggcagtgaat gggggtaaat 1740

ggcactacag gcgcctttta tggattcatg caaggaaact acccataata caagaaaagc 1800

ccgtcacggg cttctcaggg cgttttatgg cgggtctgct atgtggtgct atctgacttt 1860

ttgctgttca gcagttcctg ccctctgatt ttccagtctg accacttcgg attatcccgt 1920

gacaggtcat tcagactggc taatgcaccc agtaaggcag cggtatcatc aacaggctta 1980

cccgtcttac tgtcaaccgg atctaaaaca ctaggcccaa gagtttgtag aaacgcaaaa 2040

aggccatccg tcaggatggc cttctgctta atttgatgcc tggcagttta tggcgggcgt 2100

cctgcccgcc accctccggg ccgttgcttc gcaacgttca aatccgctcc cggcggattt 2160

gtcctactca ggagagcgtt caccgacaaa caacagataa aacgaaaggc ccagtctttc 2220

gactgagcct ttcgttttat ttgatgcctg gcagttccct actctcgcat ggggagaccc 2280

cacactacca tcggcgctac ggcgtttcac ttctgagttc ggcatggggt caggtgggac 2340

caccgcgcta ctgccgccag gcaaattctg ttttatcaga ccgcttctgc gttctgattt 2400

aatctgtatc aggctgaaaa tcttctctca tccgccaaaa cagccaagct ggatccccga 2460

tcttatcagg tcgaggtggc ccggctccat gcaccgcgac gcaacgcggg gaggcagaca 2520

aggtataggg cggcgcctac aatccatgcc aacccgttcc atgtgctcgc cgaggcggca 2580

taaatcgccg tgacgatcag cggtccagtg atcgaagtta ggctggtaag agccgcgagc 2640

gatcctt 2647

<210> 4
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> Portion of promoter sequence

<400> 4
catataacag atcttaatca tccacaggag gatatctgat g 41

<210> 5
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> Portion of promoter sequence

<400> 5
catataacag atcgatctta aacatccaca ggaggatatc tgatg 45

<210> 6
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 6
gaattcgcgc gcttcgcgat tcagtcgcgt tccttcacag ctggcgcagg ggcgattact 60

gatgaa 66

<210> 7
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 7
cccgggagtc tcctgaatac gtttcataaa tagtgtaaac gcgtgagtgt accatttcca 60

cgtagc 66

<210> 8
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 8
cccgggtaaa aaactcaaag cgttatttgc attttcgcta tagttctcgt ctgctgaaat 60

gcctggtgt 69

<210> 9
<211> 77
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 9
gaattccatt tctatcaata aattactatt agttttgtct tctaaccaag cctctatttt 60

atgagtatcc tcttcag 77

<210> 10
<211> 72
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 10
gctagcatgg ccagcagagg cgtaaacaag gtgattctcg ttggtaatct gggccaggac 60

ccggaagtac gc 72

<210> 11
<211> 64
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 11
gctagctcag aacggaatgt cgtcgtcaaa atccattggc ggttcgttag acggcgctgg 60

cgcg 64

<210> 12
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 12

gcaggaaaga acatgtgagc ctagggccag caaaaggcca ggaac 45

<210> 13
<211> 53
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 13
catgaccaaa atcccttaac tagtgtttta gatctactga gcgtcagacc ccg 53

<210> 14
<211> 53
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 14
cggggtctga cgctcagtag atctaaaaca ctagttaagg gattttggtc atg 53

<210> 15
<211> 49
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 15
gctgtcaaac atgagaattc tagaagacga aagggcctcg tgatacgcc 49

<210> 16
<211> 64
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 16
acagcctgca gacagatctt gacagctgga tcgcactctg gtataattgg gaagccctgc 60

aaag 64

<210> 17
<211> 59

<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 17
cgaagcccaa cctttcatag aagctagcgg tggatccgaa atctcgtgat ggcaggttg 59

<210> 18
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 18
aacaagcgtt ataggaattc tgtggtagca 30

<210> 19
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 19
actttcatgt tattaaagat ctgttatatg 30

<210> 20
<211> 59
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 20
agatcttaat catccacagg aggctttctg atgagtaaag gagaagaact tttcactgg 59

<210> 21
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 21

gctagctcat tatttgtaga gctcatccat gc 32

<210> 22
<211> 54
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 22
agatctgaat tctagatcat gtttgacagc ttatcatcga taagctttaa tgcg 54

<210> 23
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 23
agatcttatc aggtcgaggt ggcccggctc catgcaccgc gacgcaacgc g 51

<210> 24
<211> 61
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 24
cgcgaattct cgagacaaac tccgggaggc agcgtgatgc ggcaacaatc acacggattt 60

c 61

<210> 25
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 25
atgagcgcat tgttagattt catttttttt tcctccttat tttctagaca acatcagcaa 60

ggagaaagg 69

<210> 26
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 26
cctttctcct tgctgatgtt gtctagaaaa taaggaggaa aaaaaaatga aatctaacaa 60

tgcgctcat 69

<210> 27
<211> 65
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 27
gctacatttg aagagataaa ttgcactgga tcctagaaat attttatctg attaataaga 60

tgatc 65

<210> 28
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 28
cggagatttc ctggaagatg cctaggagat acttaacagg gaagtgagag 50

<210> 29
<211> 61
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 29
gtctgccgga ttgcttatcc tggcggatcc ggttgacagt aagacgggta agcctgttga 60

t 61

<210> 30

<211> 61
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 30
cctaggtttc acctgttcta ttaggtgtta catgctgttc atctgttaca ttgtcgatct 60

g 61

<210> 31
<211> 61
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 31
aggcttaagt agcaccctcg caagatctgg caaatcgctg aatattcctt ttgtctccga 60

c 61

<210> 32
<211> 70
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 32
gagggcgccc cagctggcaa ttctagactc gagcactttt gttacccgcc aaacaaaacc 60

caaaaacaac 70

<210> 33
<211> 61
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 33
agaagaaaaa tcgaattcca gcatgaagag tttcagaaaa tgacagagcg tgagcaagtg 60

c 61

<210> 34
<211> 59
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 34
cgaagcccaa cctttcatag aaactagtgg tggaatcgaa atctcgtgat ggcaggttg 59

<210> 35
<211> 70
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 35
gttgtttttg ggttttgttt ggcgggtaac aaaagtgctc gagtctagaa ttgccagctg 60

gggcgccctc 70

<210> 36
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Modified Promoter Sequence

<220>
<221> misc_feature
<222> (6)..(6)
<223> "n" may be G, C or A

<220>
<221> misc_feature
<222> (7)..(7)
<223> "n" is an insert of 1 to 5 nucleotides selected from A, C, G and T

<220>
<221> misc_feature
<222> (11)..(11)
<223> "n" is A, C, G or T

<400> 36
agatcnntaa ncatccacag gaggatatct gatg 34

<210> 37
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> Modified Shiga toxin sequence

<400> 37
acagcagacg cgtta 15

<210> 38
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> Modified Shiga toxin sequence

<400> 38
ctgaacctag ggcga 15

<210> 39
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> Modified Shiga toxin sequence

<400> 39
gaattcgcga ccagt 15

<210> 40
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> Modified Shiga toxin sequence

<400> 40
gaatcagatt ctgga 15